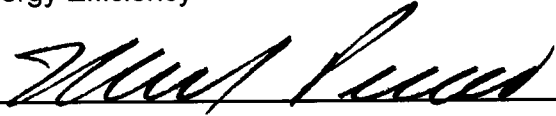


# REPORT

**DATE:** September 2, 2004  
**TO:** Regional Council  
**FROM:** Nancy Pfeffer, Sr. Planner, 213-236-1869, e-mail: pfeffer@scag.ca.gov  
**SUBJECT:** Resolution on Building Energy Efficiency

**EXECUTIVE DIRECTOR'S APPROVAL:**



## RECOMMENDED ACTION:

Adopt Resolution #04-454-2: To Encourage Adoption of Local Building Energy Efficiency Ordinances.

## SUMMARY:

The resolution encourages SCAG jurisdictions to adopt an ordinance (based on a model) requiring new buildings to exceed state building energy standards by 10-15%, depending on the building type. In response to input from the Energy & Environment Committee, the resolution includes a provision requesting the California Energy Commission to make the state standards uniformly more stringent for all jurisdictions.

## BACKGROUND:

The dramatic population growth forecasted for the SCAG region in the coming decades will involve the construction of numerous new buildings – residential, commercial, and governmental. Buildings are one of the largest consumers of energy, using one-third of total energy and nearly two-thirds of electricity. Generally, buildings use electrical power for lighting and air-conditioning and natural gas for water and space heating. Various appliances within buildings use both types of energy.

In order to alleviate the significant increase in energy consumption that will come with growth in the SCAG region, it is important to minimize the amount of energy used by buildings. Since the mid-1970's, the state of California has had building energy efficiency standards, referred to as Title 24 standards. In addition, there are several public and private programs designed to reduce building energy use even further. A notable public program is Energy Star, which sets standards for new home construction and for appliance energy use. An increasingly popular private program is the non-profit U.S. Green Building Council's Leadership in Environmental and Energy Design (LEED) program. This program offers varying levels of certification depending on the building design features, and covers energy use as well as use of water and building materials.

While building "green" can increase the initial cost of construction, recent studies have shown that the cost premium may average only about three percent, not 10-15% as had

# REPORT

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previously been thought. Moreover, investments in energy efficiency have been demonstrated to pay for themselves in operational savings. According to a study done for the California Sustainable Building Task Force, spending an extra \$100,000 on “green” building features would save at least \$1 million over the life of a \$5-million building. One large developer reports that efficiencies from its own Energy Star buildings are saving it \$13 million annually in operating costs.

A new state office building in Sacramento, housing the Department of Health Services, is estimated to be saving \$185,000 in annual energy costs through a design that is 40% more efficient than code. And the Inland Empire Utilities Agency reports that its two new headquarters buildings were built to LEED Platinum standards – the highest certification level – at a substantial savings over conventional building construction. The agency estimates that it continues to reap \$800,000 annually in electricity cost savings through measures that are 60% more stringent than the state code.

The City of Santa Monica in 2000 adopted a local ordinance requiring new construction, and renovations exceeding 50% of the cost of a new building, to exceed the Title 24 standards by 20-25%, depending on the building type.\* The ordinance does not apply to one- and two-family residential structures or qualified historical buildings. The resolution provided will encourage local jurisdictions to adopt a similar ordinance, so that the region can experience the savings and environmental benefits associated with building energy efficiency measures as the population grows.

The following materials are attached:

- Resolution
- White paper: Supporting Greater Building Energy Efficiency in the SCAG Region
- Model ordinance (included in white paper).

## **FISCAL IMPACT:**

Staff time in support of this analysis is covered by Work Element 05-290 in the current Overall Work Program. This work is funded by a grant from the U.S. Department of Energy’s Rebuild America program via the California Energy Commission. Adopting the regional resolution will have no fiscal impact on SCAG.

#101248 v1 - RC Report EE 9/04  
Pfeffer

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\* The target percentages were reduced to 10-15% when the state building standards were tightened following the state’s 2000-2001 energy crisis.

**RESOLUTION #04-454-2 OF THE SOUTHERN CALIFORNIA  
ASSOCIATION OF GOVERNMENTS TO ENCOURAGE  
ADOPTION OF LOCAL BUILDING ENERGY EFFICIENCY  
ORDINANCES**

**WHEREAS**, the Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization (MPO) for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial;

**WHEREAS**, the SCAG region is expected to experience substantial growth in population, housing, and employment in the coming decades;

**WHEREAS**, the population growth will require substantial construction of new buildings;

**WHEREAS**, buildings are large users of energy, consuming almost two-thirds of all electricity and one third of total energy, for lighting, heating, cooling, appliances, and other uses;

**WHEREAS**, the increased need for buildings will contribute to a substantial increase in energy demand in the SCAG region;

**WHEREAS**, the State of California mandates a basic level of energy efficiency in buildings under standards in Title 24, Part 6 of the California Code of Regulations;

**WHEREAS**, it is possible to reduce energy use in buildings beyond the mandates of Title 24 through improved building design, construction, and commissioning;

**WHEREAS**, reductions in building energy usage beyond the state standards will mitigate the regional environmental impacts of increased energy demand due to growth;

**WHEREAS**, the construction of buildings that go beyond the state standards can be accomplished for a small cost premium that will be paid back in energy cost savings, and sometimes can be accomplished for less cost than conventional construction;

**WHEREAS**, a model ordinance has been developed requiring new construction to exceed the Title 24 building energy efficiency standards;

**NOW, THEREFORE, BE IT RESOLVED** by the Regional Council of the Southern California Association of Governments, that SCAG does hereby encourage local jurisdictions in the SCAG region to adopt local ordinances, based on the model provided, requiring new construction to exceed the Title 24 building energy efficiency standards by 10-15%, depending on building type;

**AND BE IT ALSO RESOLVED** by the Regional Council of the Southern California Association of Governments, that SCAG does hereby request the California Energy Commission to make the state building energy efficiency standards uniformly more stringent for all jurisdictions.

**APPROVED AND ADOPTED** by the [vote] of the Regional Council of the Southern California Association of Governments at a regular meeting this 2<sup>nd</sup> day of September, 2004.

RON ROBERTS  
President, SCAG  
Councilmember, City of Temecula

Mark Pisano  
Executive Director

Karen Tachiki  
Chief Legal Counsel

# **SUPPORTING GREATER BUILDING ENERGY EFFICIENCY IN THE SCAG REGION**

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## **LEGAL NOTICE**

This document was prepared as a result of work sponsored by the California Energy Commission through a federal grant agreement number DE-FG51-02R021400 with the U.S. Department of Energy. It does not necessarily represent the views of the Federal Government, the Energy Commission, its employees, or the State of California. The Federal Government, the Commission, the State of California, its employees, contractors, and subcontractors make no warranty, express or implied, and assume no legal liability for the information in this document; nor does any party represent that the use of this information will not infringe upon privately owned rights.

# SUPPORTING GREATER BUILDING ENERGY EFFICIENCY IN THE SCAG REGION

## 1. Introduction

Southern California is facing the challenge of substantial population growth in the coming decades. The Southern California Association of Governments' (SCAG) adopted 2004 forecast projects a 38% increase in population and a 36% increase in employment between 2000 and 2030.<sup>1</sup> This growth will necessitate the development of new housing stock and accompanying new commercial and industrial growth. The number of buildings in the region can be expected to grow substantially, even if there is an increase in density. Since buildings are large energy users, the regional demand for energy can be expected likewise to grow.

At the national level, buildings have been estimated to "consume one-third of total U.S. energy, and almost two-thirds of electricity."<sup>2</sup> Buildings mainly consume energy – in the form of electricity and natural gas – for space heating and cooling, lighting, and water heating. SCAG has projected that growth in the region will lead to a similar percentage increase in residential energy demand, and has concluded that by 2030 there will be a significant cumulative regional increase in the amount of total energy consumed.<sup>3</sup> While some of this demand growth could be avoided if more compact growth patterns are adopted, different land use patterns by themselves would likely reduce 2030 demand by less than 5 percent. If Southern California is to maintain environmental quality, it is imperative that new buildings be designed and built in a way that minimizes their demand for energy.

Since the 1970's, the state of California has maintained Building Energy Efficiency Standards, also known as Title 24, Part 6 Standards. The Standards have been updated periodically to reflect advances in research and technology. The most recent update is the 2005 state standards (so called because of their effective date), which were adopted by the Energy Commission in November 2003.

In the SCAG region, the City of Santa Monica has shown local leadership by adopting, in 2000, an ordinance that required new and renovated commercial and residential buildings to reduce energy consumption below the existing (1998)

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<sup>1</sup> Southern California Association of Governments, *2004 Regional Transportation Plan: Final Draft*, (April 2004) 9, Executive Summary. The SCAG region includes Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties.

<sup>2</sup> John P. Holdren, et al, *Energy Efficiency. Federal Energy Research and Development for the Challenges of the 21<sup>st</sup> Century*. (1997)  
<[http://bcsia.ksg.harvard.edu/publication.cfm?program=STPP&ctype=testimony&item\\_id=20&gm a=27](http://bcsia.ksg.harvard.edu/publication.cfm?program=STPP&ctype=testimony&item_id=20&gm a=27)>. Accessed May 2004.

<sup>3</sup> Southern California Association of Governments, *Work done in support of 2004 Regional Transportation Plan Program Environmental Impact Report*, (April 2004). SCH #2003061075, Chapter 3.11, Energy.

Title 24 standards by 20-25%. The City of Irvine waives the building permit fee for builders who participate in their "IQ-Plus" program which calls for third party verified efficiency beyond the Standards requirements. Also, many Southern California cities encourage voluntary builder participation in the Community Energy Efficiency Program, which achieves Energy Star levels (15% lower energy consumption than required by the Standards) with third party verification to insure high quality control.

The purpose of this paper, which is funded by a grant from the U.S. Department of Energy's Rebuild America Program through the California Energy Commission (CEC), is to encourage greater building energy efficiency efforts across the SCAG region via adoption of an ordinance that would require new construction in the adopting jurisdiction to exceed the state standards.

Section 2 of this paper describes current national, state and local programs regarding building energy efficiency. Section 3 describes the expected costs and benefits of wider adoption of building energy efficiency in the SCAG region, based partly on existing research and partly on an analysis of the specific impacts in Southern California. Section 4 contains information and model language for implementing programs that exceed the Title 24 Standards.

## **2. Current Programs for Building Energy Efficiency**

Interest in "green buildings" has been growing for some time, as the impacts of buildings on the environment have come into clearer focus and a broader concern has developed regarding environmental sustainability. "Green building" standards, of course, go well beyond energy efficiency, involving usage of renewable resources and reduced waste generation and water usage, among other things. Such standards can reduce local environmental impacts, regional air pollutant emissions, and even global greenhouse gas emissions.

This paper focuses only on the energy savings available through sustainable or "green" building standards. Notably, a 2003 study conducted for the California Sustainable Building Task Force found that the 20-year value of energy savings in green buildings was more than three times the value of emissions, water, and waste savings combined.<sup>4</sup>

The following sections summarize several important building energy efficiency standards and programs. The study mentioned in the previous paragraph contains a more comprehensive discussion of building energy efficiency programs at the international, national, and state levels.

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<sup>4</sup> G. Kats, et al., *The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force* (October 2003) p. ix, Table ES-1  
<<http://www.usgbc.org/Docs/News477.pdf>>. Accessed April 2004.

## Leadership in Environmental and Energy Design (LEED)

During the 1990's, the non-profit U.S. Green Building Council developed the LEED Green Building Rating System for commercial buildings. The system awards points for various design features of a building, resulting in a rating ranging from Certified at the low end, through Silver and Gold to Platinum at the high end. The points are awarded for six categories, such as Energy and Atmosphere, Water Efficiency, and Indoor Environmental Quality. The Energy criteria include the following prerequisites:

- a requirement for building commissioning (a process to verify that fundamental building systems are installed and operating as intended); and
- a minimum level of energy efficiency for the building and its systems, based on the more stringent of the local energy code or ASHRAE<sup>5</sup> Standard 90.1-1999. (In California, the state building energy efficiency standards are more stringent.)

Project applicants can go on to rate additional LEED points by taking the following steps:

- reducing design energy cost beyond the minimum;
- supplying a portion of building energy from on-site renewable sources;
- conducting additional commissioning;
- measuring and verifying continuing system performance through installation of specific meters; and
- supplying half of the building's energy from renewable sources via contract.<sup>6</sup>

The LEED rating system has become one of the most popular and influential in the country, in part due to the participatory and professional nature of the Green Building Council.<sup>7</sup> In April 2004, the program marked its fourth year and 100<sup>th</sup> certified building.<sup>8</sup> According to the LEED web site, there are eleven LEED certified buildings in California.<sup>9</sup>

Table 1 lists several LEED certified and registered projects in the SCAG region. Registered projects are those intending to seek LEED certification.

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<sup>5</sup> American Society of Heating, Refrigerating, and Air-Conditioning Engineers, <<http://www.ashrae.org/>>.

<sup>6</sup> All energy prerequisites and credits (additional steps) from *LEED Green Building Rating System For New Construction & Major Renovations*, version 2.1 (LEED-NC, November 2002, ) 21-32

<sup>7</sup> G. Kats et al. Op cit., p. 5.

<sup>8</sup> U.S. Green Building Council press release 2004 April 14. USGBC Announces 100th LEED® Certified Project. <[http://www.usgbc.org/News/pressreleases\\_details.asp?ID=739](http://www.usgbc.org/News/pressreleases_details.asp?ID=739)>. Accessed April 2004.

<sup>9</sup> See [https://www.usgbc.org/LEED/Project/project\\_list.asp](https://www.usgbc.org/LEED/Project/project_list.asp), accessed April 2004.



**Table 1. LEED Projects in the SCAG Region**

<b>Organization</b>	<b>Building</b>	<b>City</b>	<b>Year</b>	<b>Status</b>
Southern California Gas Company	Energy Resource Center	Downey	1995	Version 1 Certified
Ford Motor Company	Premier Automotive Group North American Headquarters	Irvine	2001	Version 2 Certified
Audubon Society	Audubon Center at Debs Park	East Los Angeles	2003	Version 2 Platinum
City of Los Angeles	Lake View Terrace Library	Los Angeles	2003	Registered
City of Santa Monica	Santa Monica Main Library	Santa Monica	2003	Registered
Inland Empire Utilities Agency	Inland Empire Utilities Agency Headquarters	Chino	2003	Version 2 Platinum
Natural Resources Defense Council	Santa Monica Office	Santa Monica	2003	Registered (on target for Platinum)
Riverside Public Utilities	Casa Blanca Energy Demonstration & Customer Service Center	Riverside	2003	Registered (on target for Silver)
Toyota Motor Sales	South Campus Office Development	Torrance	2003	Version 2 Gold
Newmatic Engineering, Inc.	Newmatic Engineering Inc.	Irvine	2004	Registered
Orange County Integrated Waste Management Department	Bowerman Landfill Operations Building Addition	Irvine	2004	Registered
RAND	RAND Corporate Headquarters	Santa Monica	2004	Registered (on target for Silver)
State of California Department of Transportation	Caltrans District 7 Building Headquarters	Los Angeles	2004	Registered
Fullerton Arboretum Center	Fullerton Arboretum Interpretive Center	Fullerton	2005	Registered

However, these leaders are only the tip of the iceberg in this state, where there are more LEED projects than in any other. As of April 2004, the LEED list of registered projects included 204 building projects statewide.<sup>10</sup> Nationally, three percent of all new construction projects have registered intent to seek LEED certification.<sup>11</sup>

It is possible to reach LEED levels without doing more than just minimally complying with the Building Energy Efficiency Standards. However, projects can earn two additional LEED points by reducing energy usage 20% more than required by the Building Energy Efficiency Standards.

<sup>10</sup> See [https://www.usgbc.org/LEED/Project/project\\_list\\_registered.asp](https://www.usgbc.org/LEED/Project/project_list_registered.asp), accessed April 2004.

<sup>11</sup> U.S. Green Building Council, et al. Making The Business Case for High Performance Green Buildings, [https://www.usgbc.org/Docs/Member\\_Resource\\_Docs/makingthebusinesscase.pdf](https://www.usgbc.org/Docs/Member_Resource_Docs/makingthebusinesscase.pdf), accessed April 2004.

## Energy Star Homes

Energy Star describes itself as “a government-backed program helping businesses and individuals protect the environment through superior energy efficiency.”<sup>12</sup> The Energy Star Homes program results in energy-efficient residential construction through such measures as high-performance windows, tested and field-verified duct sealing, and properly sized and installed air conditioning, as well as higher-efficiency heating, air conditioning and water heating equipment.

California homes built to qualify for the Energy Star Homes program are 15% more efficient than the state Building Energy Efficiency Standards. Energy Star also operates programs that promote energy-efficient appliances. California’s investor-owned utilities offer financial assistance and marketing assistance to builders who build to California Energy Star Homes Program requirements, and also provide rebates on many types of Energy Star appliances.

## California Building Energy Efficiency Standards

As mentioned above, California established statewide building energy efficiency standards in the mid-1970’s following legislative action. The legislation required the standards to be cost-effective, to be based on the building life-cycle, and to include both prescriptive and performance-based approaches.<sup>13</sup> It is estimated that the standards will have saved Californians \$79 billion by 2013 (total of electricity and natural gas savings, including savings from appliance standards).<sup>14</sup>

The standards have been periodically updated as technology and design have evolved. Generally, the standards are updated every three years. As a result of AB 970, passed in Fall 2000 in response to the state’s electricity crisis, an emergency update of the Standards went into effect in June 2001. The Commission then initiated an immediate follow-on proceeding to consider and adopt updated Standards that could not be completed during the emergency proceeding. The 2005 Building Energy Efficiency Standards were adopted in November 2003, to take effect in October 2005.<sup>15</sup>

Title 24 of the California Code of Regulations comprises the state Building Standards Code. Part 6 of Title 24 is the California Energy Code, which includes

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<sup>12</sup> See <http://www.energystar.gov/>.

<sup>13</sup> California Energy Commission. Initial Study/Proposed Negative Declaration for the 2005 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Staff Report, September 2003, P400-03-018, p. 7.

<sup>14</sup> California Energy Commission. *2003 Integrated Energy Policy Report*,. P100-03-019. Sacramento, California: California Energy Commission, December 2003, p. 10. <http://www.energy.ca.gov/reports/100-03-019F.PDF>

<sup>15</sup> California Energy Commission, 2005 Energy Efficiency Building Standards Update, [http://www.energy.ca.gov/2005\\_standards/background.html](http://www.energy.ca.gov/2005_standards/background.html), accessed April 2004.

the building energy efficiency standards. The standards<sup>16</sup> include provisions applicable to all buildings, residential and non-residential, that describe requirements for documentation and certificates that the building meets the standards. These provisions include mandatory requirements for efficiency and design of the following types of systems, equipment, and appliances:

- Air conditioning systems
- Heat pumps
- Water chillers
- Gas- and oil-fired boilers
- Cooling equipment
- Water heating systems and equipment
- Pool and spa heating systems and equipment
- Gas-fired equipment including furnaces and cooking appliances
- Windows and exterior doors
- Joints and other openings in the building structure ("envelope")
- Insulation and cool roofs
- Lighting control devices.

The standards include additional mandatory requirements for space-conditioning (cooling and heating), water-heating, and indoor and outdoor lighting systems and equipment in non-residential, high-rise residential, and hotel or motel buildings. These standards cover ventilation, controls, pipe insulation, air distribution systems, and acceptance provisions. Mandatory requirements for low-rise residential buildings cover indoor and outdoor lighting, fireplaces, space cooling and heating equipment (including ducts and fans), and insulation of the structure, foundation, and water piping.

In addition to the mandatory requirements, the Standards call for further energy efficiency that can be provided through a choice between performance and prescriptive compliance approaches. (Separate sections apply to low-rise residential and to non-residential, high-rise residential, and hotel or motel buildings.) In buildings designed for mixed use (e.g., commercial and residential), each section must meet the standards applicable to that type of occupancy.<sup>17</sup>

In general, the performance approach provides for the calculation of an energy budget for each building, and allows flexibility in the design and selection of building systems and features to meet the budget. The energy budget addresses space-conditioning (cooling and heating), lighting, and water heating. Compliance with the budget is determined by the use of a CEC-approved computer software energy model. The alternative prescriptive standards require

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<sup>16</sup> California Energy Commission, 2005 Building Energy Efficiency Standards, Commission Proposed Standards, P400-03-001ET15, October 2003.

<sup>17</sup> Ibid., Section 100(f).

demonstrating compliance with specific minimum efficiency for components of the building such as building envelope insulation R-values, fenestration (areas, U-factor and solar heat gain coefficients of windows and doors) and heating and cooling, water heating and lighting system design requirements. These requirements vary depending on which of the state's 16 climate zones the building is in.

The 2005 standards, which were adopted by the California Energy Commission in November 2003, and are expected to become effective statewide in October 2005, include the following major changes:

- Updated energy budgets that recognize the time dependence of energy usage by season and time of day.
- Incorporation of new federal appliance standards and other advances in technology emerging from the state's Public Interest Energy Research program.
- Incorporation of new state standards for outdoor lighting and for indoor and outdoor signs.
- Changes to improve the quality of construction and verification of reliable energy savings.

#### City of Santa Monica

State building energy efficiency standards provide that local jurisdictions may adopt local energy standards as long as they do not allow more building energy consumption than the state standards. Local standards may include early adoption of the state standards or requirements that buildings go beyond the standards, for example, by setting more stringent energy budgets.<sup>18</sup>

Local standards were adopted by Santa Monica in 2000, when the City Council adopted Ordinance Number 896 (see Appendix A). The ordinance applies to all new buildings, residential and commercial, except one- and two-family houses and qualified historic buildings. It also applies to existing buildings whose repair, alteration, or rehabilitation costs more than 50 percent of their replacement cost. The ordinance included required reduction factors for allowable energy budgets ranging from 20% to 25% below the then-effective 1998 state building energy standards, depending on the building use.<sup>19</sup> Santa Monica's ordinance, like other green building schemes, also includes requirements for use of recycled construction materials.

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<sup>18</sup> Ibid., Section 10-106.

<sup>19</sup> When the state standards were revised in 2001 following passage of AB 970, these percentage reductions were reduced to 10% to 15% since the state standards had become more stringent. City staff say that the percentages are likely to remain the same with the adoption of the 2005 state standards.

Santa Monica has also demonstrated leadership in the energy efficiency arena by incorporating solar panels into city parking structures, constructing a new Public Safety Facility that is estimated to have cost-effectively exceeded the Title 24 requirements by at least 40%,<sup>20</sup> and by working with partners to build Colorado Court, a “green” yet affordable housing complex.

#### City of Irvine

In 1996-97 the City of Irvine and the California Energy Commission partnered to develop a voluntary energy efficiency program. Irvine Quality Plus, or “IQ+,” is a program whereby residential builders are rebated city inspection fees and receive certificates, program marketing and other recognition when they meet certain maximum duct leakage levels and provide quality installation of wall, attic and underfloor insulation, with third-party verification.

The program has reduced duct leakage in some homes from as much as 70% to less than 6% (the average duct leakage in new homes statewide, where builders are not participating in a “tight” or “sealed” duct program, is approximately 22%). IQ+ was the prototype for the “sealed ducts” prescriptive requirement in the Title 24 energy standards. Irvine and the Commission are in the process of updating the IQ+ program protocols to exceed the 2005 Energy Efficiency Standards.

#### Community Energy Efficiency Program

In 1999, the Building Industry Institute (BII), the training and education arm of the California Building Industry Association, worked with an industry and government advisory group to develop the Community Energy Efficiency Program for local governments. The concept was for local governments to offer a range of incentives to motivate builders to improve the energy efficiency of new home construction in their community by 15% compared to Title 24.

Forty-five SCAG member cities and an additional seven non-member cities are currently participants in this program (see Appendix B); there are over seventy participants statewide. Incentives offered by participating jurisdictions include expedited review of building plans, permit fee reduction, and public recognition of the builder for their efforts.<sup>21</sup> The hallmark of the program is third-party field verification of the quality of installation of the energy efficiency measures. By providing third-party field verification, the program is particularly helpful to local governments, who can be assured that the energy efficiency measures are installed properly without intensive site inspections by local building department staffs.

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<sup>20</sup> California Energy Commission. July 2000. Draft, *Tier 1: A New Energy Standard for State Buildings, Consultant Report* (July 2000) P400-00-019, page 3.

<sup>21</sup> See <http://www.thebii.org/lgp.asp>.

## Collaborative for High Performance Schools

New school facilities are much in need throughout the state. This California non-profit group, known as CHPS, provides best practices and criteria for the construction of schools so as to create “environments that are not only energy efficient, but also healthy, comfortable, well lit and contain the amenities needed for a quality education.”<sup>22</sup> CHPS schools provide more natural daylight and a healthier environment for students, teachers, and staff, and are beginning to reduce school district expenditures on energy, which according to CHPS exceed the combined costs of supplies and books.<sup>23</sup>

## California Governor's Sustainable Building Goal

On August 2, 2000, California Governor Gray Davis signed Executive Order D-16-00, “to site, design, deconstruct, construct, renovate, operate, and maintain state buildings that are models of energy, water, and materials efficiency; while providing healthy, productive and comfortable indoor environments and long-term benefits to Californians.”<sup>24</sup> New state buildings, such as the Department of General Services' East End Complex Block 225 in Sacramento, have been built to sustainable standards as a result. The California Integrated Waste Management Board maintains a web site that provides further information and resources for green building design and construction.<sup>25</sup>

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<sup>22</sup> <<http://www.chps.net/overview/index.htm>>.

<sup>23</sup> Ibid.

<sup>24</sup> Executive Order D-16-00 by the Governor of the State of California. August 2, 2000.

<sup>25</sup> See <http://www.ciwmb.ca.gov/greenbuilding/Basics.htm>.

### 3. Costs and Benefits of Building Energy Efficiency Standards

One of the main considerations when undertaking improvements to building energy efficiency is, of course, cost. It may cost more to provide energy-efficient building components and systems, and first cost (i.e., design and construction cost) can be a hurdle even when the installed systems will save money over the life of the building. Energy efficiency measures can save first costs, for example, by reducing the need for over-sized air conditioners to keep buildings comfortable. (Undertaking a more comprehensive design approach to building sustainability can also save first costs through reuse of building materials and other means.)

In recent years, several studies have demonstrated that life-cycle savings clearly result from building energy efficiency efforts. Furthermore, these studies have clarified that the first cost penalty for green building measures is only about 2-3% at most, and there can be a first cost benefit. The following sections summarize the findings of these studies and make the case that wider adoption of building energy ordinances across the SCAG region will go far to alleviate the potential energy and environmental impacts of growth.

#### Building Level Savings

A study conducted for the City of Portland in 2000 analyzed three city buildings – an office building, a police precinct, and a fire station -- that were built in the 1990's without regard to green building standards. The study estimated both first cost and life cycle costs for the buildings as if they had been built according to LEED standards then under development, and compared these with actual costs. The analysis found that:

- The life cycle costs of the buildings would have been reduced by \$13,000 up to \$173,000 (for the largest building) if LEED-like standards had been followed.
- These estimates do not include probable employee productivity benefits resulting from better working conditions – lighting, ventilation, and so forth. The study estimated that life cycle cost savings would be 10 to 15 times the direct cost savings – ranging from \$101,900 up to over \$3 million for the largest building – if these benefits were considered.
- First costs were estimated to have been at most 2.2% higher if LEED standards had been applied; for one building, first costs would have been the same or even slightly lower (depending on whether first costs or life cycle costs are minimized).<sup>26</sup>

A number of building projects in the SCAG region have pursued green designs, with the following results:

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<sup>26</sup> XENERGY, Inc., and Sera Architects. *Green City Buildings: Applying the LEED™ Rating System*. (Prepared for Portland Energy Office: Portland, Oregon, June 18, 2000) p. S-2 – S-6.

- The Inland Empire Utilities Agency (IEUA) used comprehensive building design and tilt-up construction to reduce by one-third the cost of its new headquarters. Their two new buildings cost approximately \$10.1 million to build, but would have cost an estimated \$15.7 million if they were standard buildings built by conventional means. Furthermore, due to the energy-efficient design, "IEUA expects to save over \$200,000 per year in energy costs alone over the next ten years."<sup>27</sup>
- The RAND Corporation analyzed its new headquarters building in Santa Monica before construction. While the new building might cost about 10% more than a conventional design, the company expects to use the building for far longer than the estimated 10- to 12-year payback period.<sup>28</sup>
- Caltrans District 7 undertook a green building in response to the Governor's Executive Order of 2000 (see Section 2). The building designers anticipated a cost premium for the green building but expected payback within less than 10 years.<sup>29</sup>
- Toyota Motor Sales created a new national headquarters building in Torrance with the goal of bringing all its personnel into one campus with minimum operating costs. The company saw an opportunity to build a sustainable building and made each decision about design features and systems based on business criteria. For example, the choice of cooling system was based on economics and reliability, and also happened to be environmentally preferable. Toyota used the state's 50% buydown incentive for self-generation to include photovoltaic panels on the roof with a payback of seven years for that system. In total, the efforts made to reduce costs and achieve sustainability earned the building a LEED Gold rating even though this was not the goal of the project.<sup>30</sup>
- The Los Angeles Community College District is dedicating bond funding to the construction of 46 new LEED buildings across its system over the next several years. The target design level ranges from Certified to Silver at a cost premium estimated to be between 3% and 10%. Project personnel indicated that the Board took this decision in an environment where the cost premium for building green is clearly diminishing as more materials and systems become available and the market for them grows.<sup>31</sup>

A summary of green building benefits by the U.S. Green Building Council<sup>32</sup> points out the following green building successes:

<sup>27</sup> <http://www.ieua.org/Agency/NewHQ.htm>, accessed April 2004.

<sup>28</sup> I. Katagiri, RAND Corporation, personal communication, May 2004.

<sup>29</sup> R. Makarem, AC Martin, personal communication, May 2004.

<sup>30</sup> M. Yamaguchi, Toyota, personal communication, May 2004.

<sup>31</sup> A. Kovara, DMJM/JGM, and L. Eisenberg, Los Angeles Community College District, personal communication, May 2004.

<sup>32</sup> U.S. Green Building Council, et al. *Making The Business Case for High Performance Green Buildings*, <[https://www.usgbc.org/Docs/Member\\_Resource\\_Docs/makingthebusinesscase.pdf](https://www.usgbc.org/Docs/Member_Resource_Docs/makingthebusinesscase.pdf)>. Accessed April 2004.



- “S.C. Johnson’s Worldwide Headquarters in Racine, WI, incorporates green features such as personal environmental systems, a restored natural site, and extensive daylighting, at a cost 10 to 15% *below* the U.S. average for comparable office and laboratory space.” (emphasis in original)
- “Almost an acre of energy-generating photovoltaic panels are in operation on the roof of Arden Realty’s 110,000-square-foot City Centre Office Building in Fountain Valley, CA.”
- “Energy Star-labeled office buildings generate utility bills 40% less than the average office building. For international developer and investor Hines, efficiencies gained from its Energy Star buildings are generating \$13 million in annual savings, based on a 2000 evaluation.”
- “Lockheed Martin’s trailblazing 600,000-square-foot facility in Sunnyvale, CA, housing 2,500 employees...reported a 15% drop in employee absenteeism – a savings that paid for the incremental costs of the company’s new high performance facility in the very first year alone.”
- “USAA Realty Company’s La Paz Office Plaza in Orange County, CA, experienced an \$0.80-per-square-foot-increase in market value – a \$1.5 million increase stemming from its investments in energy efficiency measures and lower-priced power procurements.”

Probably the most comprehensive and persuasive study of the value of green building savings is the 2003 report to California’s Sustainable Building Task Force. In the words of the report:

Integrating “sustainable” or “green” building practices into the construction of state buildings is a solid financial investment. In the most comprehensive analysis of the financial costs and benefits of green building conducted to date, this report finds that a minimal upfront investment of about two percent of construction costs typically yields life cycle saving of over ten times the initial investment. For example, an initial upfront investment of up to \$100,000 to incorporate green building features into a \$5 million project would result in a savings of at least \$1 million over the life of the building, assumed conservatively to be 20 years.<sup>33</sup>

### City- and State-Level Savings

At the city level, one report estimates that the green building ordinance adopted by the City and County of San Francisco would save \$22 million over ten years.<sup>34</sup> Before adopting its ordinance, Santa Monica hired a consultant to determine energy budget targets that would increase first costs no more than 3% and provide a five-year simple payback.<sup>35</sup>

<sup>33</sup> G Kats, et al. Op. cit., p. v.

<sup>34</sup> California Integrated Waste Management Board. *The Economics of Green Buildings*. (June 2001), Task Three Report, p. 7. Prepared by Natural Strategies LLC.

<sup>35</sup> S. Munves, City of Santa Monica, personal communication, April 2004.

The Initial Study/Proposed Negative Declaration for the 2005 Building Energy Efficiency Standards prepared by the California Energy Commission found overall energy and environmental benefits from the standards update.<sup>36</sup> Annual cumulative statewide energy savings from implementation of the standards were estimated at over 600 GWh of electricity and 10 million therms of natural gas, along with a 181-MW drop in peak demand. Statewide total emissions reductions from application of the 2005 standards were estimated at 42 tons/year of NO<sub>x</sub>, 3 tons/year of PM<sub>10</sub>, and 8 tons/year of CO.<sup>37</sup>

### Potential Savings in the SCAG Region

The SCAG region will receive a share of the foregoing benefits from application of the state 2005 energy efficiency standards. For example, the SCAG region consumes about 45% of statewide total electricity,<sup>38</sup> and can be expected to enjoy a similar share of energy savings benefits and emissions benefits (with some differences depending on the location of power generation).

The region will receive further energy and emissions savings and benefits from local adoption of standards beyond Title 24. If this step were taken regionwide, CEC estimates show that the SCAG region could experience a further reduction in electricity demand amounting to about 199 GWh/year and for natural gas amounting to about 2.9 million therms per year, as well as a 50-MW reduction in peak power demand. While these savings are small in percentage terms, the related emissions savings could be significant. According to CEC estimates, with local adoption of ordinances going beyond Title 24, the region could experience a further decrease of 51 tons/year of NO<sub>x</sub>, 7 tons/year of PM<sub>10</sub>, and 25 tons/year of CO.<sup>39</sup> Emissions of the greenhouse gas CO<sub>2</sub> would also be reduced.

Compared to other types of emission reduction measures, energy efficiency measures can be a low-cost option – even no-cost, as in the case of behavior changes. Energy efficiency measures can be most cost-effective in combination with integrated building design efforts that allow synergies between systems and the structure itself.

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<sup>36</sup> California Energy Commission—Staff Report, *Initial Study/Proposed Negative Declaration for the 2005 Building Energy Efficiency Standards for Residential and Non-residential Buildings*, (September 2003) P400-03-018, Section VII, Cumulative Effects.

<sup>37</sup> The report points out that some space cooling is natural-gas-fired, which may cause localized emissions in some air basins. However, the CEC estimates that the contribution from gas cooling would be no more than 0.001% over current emission levels, and would be “dwarfed” by the overall emission reductions from the standards. Individual air districts can also restrict the use of gas-fired cooling without conflicting with the state standards.

<sup>38</sup> Southern California Association of Governments. *Regional Comprehensive Plan and Guide, Energy Chapter Update 2002*, p. 11.

<sup>39</sup> R. Hudler, California Energy Commission, personal communication, May 2004. Unlike the statewide estimates for adoption of the 2005 standards, these estimates include emissions from natural gas combustion in power plants in addition to emissions from on-site usage.

#### 4. Conclusion

At the Western Governors' Association Energy Summit meeting in April 2004, California Governor Arnold Schwarzenegger and New Mexico Governor Bill Richardson issued a bipartisan proposal to raise Western states' energy efficiency by 20 percent by 2020. The two governors' letter saw "a combined economic and environmental opportunity to develop alternative energy resources and energy efficiency to 'help stabilize fluctuating energy prices, create lasting jobs, promote public health and protect our environment.'"<sup>40</sup>

Based on the demonstrated benefits of efforts to reduce building energy consumption, and given the growth expected in the SCAG region, local cities and counties may want to pursue more aggressive "beyond-the-Standards" energy consumption targets.

#### Locally Adopted Energy Standards

As mentioned in Section 2, the state Building Energy Efficiency Standards provide that local jurisdictions may adopt building energy standards as long as the resulting buildings will not use more energy than under the state standards. To ensure this, a city or county in the SCAG region may choose to adopt an ordinance requiring new or modified construction to go beyond the state standards by a certain percentage. To assist local jurisdictions in this effort, a model ordinance is provided in Appendix C which is based on the Santa Monica ordinance of 2000. Any city or county could modify the target percentages based on local needs and climate conditions.

A jurisdiction adopting local standards must submit four copies of the following documentation to the CEC:<sup>41</sup>

- a. The proposed local energy standards (requiring early adoption).
- b. A study and supporting analysis showing how energy savings were determined.
- c. A statement that the local standards will require buildings to be designed to consume no more energy than permitted by Title 24, Part 6.
- d. The basis of the determination that the standards are cost-effective.

The CEC must approve the local ordinance before it is adopted. Following submission of these materials, a jurisdiction should expect about two months for CEC approval. Once this is received, local adoption may proceed.

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<sup>40</sup> California Energy Markets. *Working Energy Development for the Greater West*, (April 23, 2004) 4, No. 768.

<sup>41</sup> California Energy Commission, 2005 Building Energy Efficiency Standards, Commission Proposed Standards, P400-03-001ET15, October 2003. Section 10-106(b), based on Section 25402.1, Public Resources Code.

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## **APPENDIX A**

**Santa Monica Ordinance No. 896 of December 19, 2000  
(6 pages)**

Santa Monica Green Building Program

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City Council Meeting 12-19-2000 Santa Monica, California

ORDINANCE NUMBER 896 (CCS)

(City Council Series)

AN ORDINANCE OF THE CITY COUNCIL

OF THE CITY OF SANTA MONICA

ADDING CHAPTER 8.108 TO THE SANTA MONICA MUNICIPAL CODE

WHICH ADOPTS SANTA MONICA AMENDMENTS

TO THE CALIFORNIA BUILDING STANDARDS CODE

RELATING TO GREEN BUILDING STANDARDS

WHEREAS, on June 8, 1999, the City Council adopted Ordinance Number 1945 (CCS), which adopts the California Building Standards Code, Santa Monica amendments to the California Building Standards Code; and other technical codes; and

WHEREAS, Health and Safety Code Sections 18938 and 17958 provides that the California Building Standards Code establishes building standards for all occupancies throughout the State; and

WHEREAS, Health and Safety Code Section 18941.5 provides that the City may establish more restrictive building standards if they are reasonably necessary due to local climatic, geological or topographical conditions; and

WHEREAS, the City Council has considered the 1998 edition of the California Building Standards Code, which incorporates by reference the 1996-1997 editions of the Technical Codes, and all of the referenced standards, tables, matrices and appendices of each of these codes therein; and

WHEREAS, based upon the findings contained in the Resolution adopted concurrently with this Ordinance, the City Council has found that certain modifications and additions to the California Building Standards Code are reasonably necessary based upon local climatic, topographical and geological conditions; and

WHEREAS, Public Resource Code Section 25402.1(h)(2) says that a local enforcement agency may adopt more restrictive energy standards when they are cost-effective and approved by the Energy Commission; and

WHEREAS, the City hired a private consultant to conduct a cost study of the proposed changes and said study demonstrated the cost effectiveness of these changes; and

WHEREAS, the State Energy Commission approved the proposed standards on September 20, 2000;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF SANTA MONICA DOES ORDAIN AS FOLLOWS:

SECTION 1. Chapter 8.108 is hereby added to the Santa Monica Municipal Code to read as follows:

## **CHAPTER 8.108 GREEN BUILDING STANDARDS**

### **8.108.010 Purpose.**

The green building design and construction standards established in this chapter are intended to reduce human exposure to noxious materials; conserve non-renewable energy and scarce materials; minimize the ecological impact of energy and materials used; use renewable energy and materials that are sustainably harvested; and protect and restore local air, water, flora and fauna. These standards will help protect the health of building occupants; improve employee productivity; use energy, water and materials more efficiently; incorporate recycled-content building materials; and increase the durability, ease of maintenance, and economy of building operations.

#### **8.108.020 Scope.**

The provisions of this chapter shall apply to all new buildings, and existing buildings whose repair, alteration or rehabilitation costs exceed 50 percent of their replacement cost as determined by Section 8.84.040 except (a) one-and-two-family dwellings and their accessory structures and (b) qualified historic buildings as defined in the State Historic Building Code (Title 24, Part 8).

#### **8.108.030 Compliance Methods.**

(a) Except as provided in subsections (b) and (c) of this Section, the envelope, space-conditioning, lighting and service water-heating systems of all buildings subject to the provisions of this chapter shall be designed, constructed and installed to use no more source energy from non-renewable sources than the allowable energy budget calculated in accordance with the performance approach set forth in Chapter 8.36 and reduced in accordance with Section 8.108.040.

(b) Multi-family residential buildings that are three stories or less in height may use the prescriptive approach set forth in Chapter 8.36 for the envelope, space-conditioning, lighting and service water-heating systems if these buildings also meet the following requirements:

- (1) all windows and glass patio doors are equipped with double-glazed, low-emissivity glazing, with center-of-glass U-value not more than 0.32 Btu/(hr.sq.ft. deg. F.), and Solar Heat Gain Coefficient not more than 0.37;
- (2) fixed lighting fixtures installed within the dwelling units have a combined average efficacy of not less than 40 lumens per watt;



- (3) water heaters have a minimum energy factor of 0.60; and
- (4) space cooling appliances (if installed) have a Seasonal Energy Efficiency Ratio (SEER) of not less than 12.
- (c) When building designs, materials or devices cannot be adequately modeled by the performance approach, alternate calculation methods may be used when approved by the California Energy Commission pursuant to their administrative regulations for exceptional methods.

**8.108.040 Reductions in Allowable Energy Budgets.**

Allowable energy budgets shall be the allowable energy budget determined in accordance with Chapter 8.36 and reduced by the following factors for the occupancy types shown in Table 8.108-A. Required reduction factors for occupancies not shown in Table 108-A shall be determined by the Building Officer for the most similar energy consuming use.

**Table 8.108-A**

**Required Reduction Factors for Allowable Energy Budgets**

Multi-family residences	20%
Hotels and motels	25%
Commercial and institutional offices	25%
Light industrial	25%
Retail	20%

When determining compliance with the percentage reduction, alternate calculation methods that consider energy savings in addition to those recognized in Chapter 8.36 may be used when approved by the Building Officer. These savings may include, but are not limited to, efficiency of fan systems with motors less than twenty-five horsepower and garage ventilation controls.

### **8.108.050 Use of Recycled Construction Materials.**

All new buildings subject to the provisions of the chapter shall be built with a minimum of four major construction materials that have a post-consumer recycled content that meets the Environmental Protection Agency (EPA) recycled content guidelines as set forth in the Comprehensive Guideline for Procurement of Products Containing Recovered Materials (CPG) and the Recovered Materials Advisory Notices (40 CFR Part 247), or any successor publication. Building and Safety Division shall maintain copies of the most recent guidelines issued by the EPA. Major construction materials are those materials that serve a structural, partitioning or finishing function throughout the building or cover more than one-half of the floor, roof or wall surfaces.

### **8.108.060 Additional Mandatory Features for All Buildings**

**(a) Solar Water Heating.** Solar collectors shall be the primary source to heat swimming pool water and to preheat industrial process water, including but not limited to, car washes and laundries.

**(b) Pipe Insulation.** All hot water distribution and recirculating system piping shall be thermally insulated from the heater to the end-use fixtures. Pipe insulation shall have R-value equal to R-4 for piping 2 inches or less in diameter and R-6 for larger piping. The R-value specified shall not be exceeded.

**(c) Heat Traps.** Heat traps shall be provided on the inlets and outlets of non-circulating hot water heaters and tanks to reduce the buoyancy-induced flow of hot water through the piping. Bent piping for heat traps shall have a minimum external diameter of twelve inches.

SECTION 2. Section 8.36.010 of the Santa Monica Municipal Code is amended to read as follows:

### **8.36.010. Adoption.**

That certain document entitled "California Energy Code, 1998 Edition," which is Part 6 of Title 24 of the California Code of Regulations, as published by the California Building Standards Commission and the International Conference of Building Officials is hereby adopted as the Energy Code of Santa Monica, subject to the provisions of Chapter 8.108 Green Building Standards.

SECTION 3. Any provision of the Santa Monica Municipal Code or appendices thereto, inconsistent with the provisions of this Ordinance, to the extent of such inconsistencies and no further, are hereby repealed or modified to that extent necessary to effect the provisions of this Ordinance.

SECTION 4. If any Section, subsection, sentence, clause, or phrase of this Ordinance is for any reason held to be invalid or unconstitutional by a decision of any court of any competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council hereby declares that it would have passed this Ordinance, and each and every Section, subsection, sentence, clause, or phrase not declared invalid or unconstitutional without regard to whether any portion of the Ordinance would be subsequently declared invalid or unconstitutional.

SECTION 5. The Mayor shall sign and the City Clerk shall attest to the passage of this Ordinance. The City Clerk shall cause this ordinance, or a summary thereof to be published once in the official newspaper within 15 days after its adoption. This Ordinance shall be effective 30 days after its adoption.

APPROVED AS TO FORM:

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MARSHA JONES MOUTRIE

City Attorney

000176

## **APPENDIX B**

### **List Of SCAG Region Participating Jurisdictions In CEEP (1 page)**

**Southern California Local Government Community Energy Efficiency Program Participants**

**SCAG Members**

Apple Valley  
Arcadia  
Beaumont  
Brea  
Camarillo  
Cathedral City  
Chino  
Chino Hills  
Corona  
Costa Mesa  
Desert Hot Springs  
Fontana  
Garden Grove  
Hemet  
Highland  
Huntington Beach  
Indian Wells  
Lake Elsinore  
Lancaster  
Loma Linda  
Monterey Park  
Moorpark  
Moreno Valley  
Murrieta  
Norco  
Ontario  
Orange County  
Palm Desert  
Palm Springs  
Placentia  
Rancho Cucamonga  
Rancho Mirage  
Redlands  
Riverside County  
San Bernardino  
San Bernardino County  
Santa Clarita  
Simi Valley  
Temecula  
Thousand Oaks  
Tustin  
Upland  
Ventura  
Victorville  
Yorba Linda

**SCAG Non-Members**

Banning  
Fullerton\*  
Hesperia  
Mission Viejo  
Orange  
San Jacinto  
Westminster

\* As of June 2004, the City of Fullerton had voted to join SCAG.

Source: *The Building Industry Institute web site, <http://www.thebii.org/lgp.asp>, accessed April 2004.*

## **APPENDIX C**

### **Model Ordinance for Exceeding State Building Energy Efficiency Standards (3 pages)**

## MODEL LOCAL BUILDING ENERGY EFFICIENCY ORDINANCE

ORDINANCE NUMBER:

AN ORDINANCE OF THE CITY COUNCIL OF \_\_\_\_\_

WHEREAS, on [date], the \_\_\_\_\_ City Council adopted Ordinance Number \_\_\_\_\_, which adopts the California Building Standards Code, [city] amendments to the California Building Standards Code, and other technical codes; and

WHEREAS, Health and Safety Code Sections 18938 and 17958 provides that the California Building Standards Code establishes building standards for all occupancies throughout the State; and

WHEREAS, Health and Safety Code Section 18941.5 provides that the City may establish more restrictive building standards if they are reasonably necessary due to local climatic, geological or topographical conditions; and

WHEREAS, the City Council has considered the [current year] edition of the California Building Standards Code, and all of the referenced standards, tables, matrices and appendices of each of these codes therein; and

WHEREAS, based upon the findings contained in the Resolution adopted concurrently with this Ordinance, the City Council has found that certain modifications and additions to the California Building Standards Code are reasonably necessary based upon local climatic, topographical and geological conditions; and

WHEREAS, Public Resource Code Section 25402.1(h)(2) says that a local enforcement agency may adopt more restrictive energy standards when they are cost-effective and approved by the Energy Commission; and

WHEREAS, the State Energy Commission approved the proposed standards on [date];

NOW, THEREFORE, THE CITY COUNCIL OF [City] DOES ORDAIN AS FOLLOWS:

I. Chapter #\_\_\_\_\_ is hereby added to the [City] Municipal Code to read as follows:

### **GREEN BUILDING STANDARDS**

#### **\_\_\_-1. Purpose.**

The green building design and construction standards established in this chapter are intended to reduce human exposure to noxious materials; conserve non-renewable energy and scarce materials; minimize the ecological impact of energy and materials used; use renewable energy and materials that are sustainably harvested; and protect and restore local air, water, flora and fauna. These standards will help protect the health of building occupants; improve employee productivity; use energy, water and materials more efficiently; incorporate recycled-content building materials; and increase the durability, ease of maintenance, and economy of building operations.

#### **\_\_\_-2. Scope.**

The provisions of this chapter shall apply to all new buildings, and existing buildings whose repair, alteration or rehabilitation costs exceed 50 percent of their replacement cost as determined by Section \_\_\_-4 except (a) one-and-two-family dwellings and their accessory

structures and (b) qualified historic buildings as defined in the State Historic Building Code (Title 24, Part 8).

**\_\_\_-3. Compliance Methods.**

(a) Except as provided in subsections (b) and (c) of this Section, the envelope, space-conditioning, lighting and service water-heating systems of all buildings subject to the provisions of this chapter shall be designed, constructed and installed to use no more source energy from non-renewable sources than the allowable energy budget calculated in accordance with the performance approach set forth in [City] Energy Code and reduced in accordance with Section \_\_\_-4.

(b) Multi-family residential buildings that are three stories or less in height may use the prescriptive approach, set forth in [City] Energy Code for the envelope, space-conditioning, lighting and service water-heating systems if these buildings also meet the following requirements:

- (1) All windows and glass patio doors are equipped with double-glazed, low-emissivity glazing, with center-of-glass U-value not more than 0.32 Btu/(hr.sq.ft. deg. F.), and Solar Heat Gain Coefficient not more than 0.37;
- (2) Fixed lighting fixtures installed within the dwelling units have a combined average efficacy of not less than 40 lumens per watt;
- (3) Water heaters have a minimum energy factor of 0.60; and
- (4) Space cooling appliances (if installed) have a Seasonal Energy Efficiency Ratio (SEER) of not less than 12.

(c) When building designs, materials or devices cannot be adequately modeled by the performance approach, alternate calculation methods may be used when approved by the California Energy Commission pursuant to their administrative regulations for exceptional methods.

**\_\_\_-4. Reductions in Allowable Energy Budgets.**

Allowable energy budgets shall be the allowable energy budget determined in accordance with [City] Energy Code and reduced by the following factors for the occupancy types shown in Table A. Required reduction factors for occupancies not shown in Table A shall be determined by the Building Officer for the most similar energy consuming use.

Table A  
Required Reduction Factors for Allowable Energy Budgets

Multi-family residences	10%
Hotels and motels	15%
Commercial and institutional offices	15%
Light industrial	15%
Retail	10%

When determining compliance with the percentage reduction, alternate calculation methods that consider energy savings in addition to those recognized in [City] Energy Code may be used when approved by the Building Officer. These savings may include, but are not limited to, efficiency of fan systems with motors less than twenty-five horsepower and garage ventilation controls.

**\_\_\_-5. Additional Mandatory Features for All Buildings**

**(a) Solar Water Heating.** Solar collectors shall be the primary source to heat swimming pool water and to preheat industrial process water, including but not limited to, car washes and laundries.

**(b) Pipe Insulation.** All hot water distribution and re-circulating system piping shall be thermally insulated from the heater to the end-use fixtures. Pipe insulation shall have R-value equal to R-4 for piping 2 inches or less in diameter and R-6 for larger piping. The R-value specified shall not be exceeded.



**(c) Heat Traps.** Heat traps shall be provided on the inlets and outlets of non-circulating hot water heaters and tanks to reduce the buoyancy-induced flow of hot water through the piping. Bent piping for heat traps shall have a minimum external diameter of twelve inches.

- II. [City] Energy Code is amended to read as follows:

**Adoption.**

That certain document entitled "California Energy Code, [current year] Edition," which is Part 6 of Title 24 of the California Code of Regulations, as published by the California Building Standards Commission and the International Conference of Building Officials is hereby adopted as the Energy Code of [City], *subject to the provisions of Chapter \_\_\_\_\_, Green Building Standards.*

- III. Any provision or appendices thereto, inconsistent with the provisions of this Ordinance, to the extent of such inconsistencies and no further, are hereby repealed or modified to that extent necessary to effect the provisions of this Ordinance.
- IV. If any Section, subsection, sentence, clause, or phrase of this Ordinance is for any reason held to be invalid or unconstitutional by a decision of any court of any competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council hereby declares that it would have passed this Ordinance, and each and every Section, subsection, sentence, clause, or phrase not declared invalid or unconstitutional without regard to whether any portion of the Ordinance would be subsequently declared invalid or unconstitutional.
- V. The Mayor shall sign and the City Clerk shall attest to the passage of this Ordinance. The City Clerk shall cause this ordinance, or a summary thereof to be published once in the official newspaper within [#] days after its adoption. This Ordinance shall be effective [#] days after its adoption.